

Claim Amendments Ser. No. 09/960,613:

1. (Currently Amended) A method of cleaning a microfiltration filter clogged with flocculated materials, ~~comprising in a wastewater treatment system wherein wastewater is passed through the microfiltration filter, wherein the method comprises the steps of :~~ adding a dispersing agent to a quantity of the wastewater wherein the dispersing agent is determined to break up floc into smaller particles, soaking the filter in said wastewater and dispersing agent, and back flushing the filter to remove the clogged flocculated material and restore flux through the membrane ~~to break up said flocculated materials to form dispersed precipitates, and removing said dispersed precipitates from said filter.~~
2. The method of claim 1 wherein said flocculated materials clogging said filter comprises inorganic, organic or a mixture of inorganic and organic particles.
3. (Currently Amended) The method of claim 2 wherein said flocculated materials clogging said filter comprises CMP processing solids, alone or in combination with ~~other~~ wastes, iron hydroxide or oxide, surfactants.
4. The method of claim 1 wherein said dispersing agent comprises a polyacrylic acid or a derivative of polyacrylic acid including acidic types, sodium salts, ammonium salts, and amine salts.
5. (Currently Amended) The method of claim 1 wherein said dispersing agent is selected from a group consisting of hydroxy-ethylidene diphosphonic acid, sodium diisopropylnaphthalenesulfonate, and ~~other~~ water soluble dispersing agents.
6. The method of claim 5 wherein said dispersing agent is hydroxy-ethylidene diphosphonic acid.
7. The method of claim 1 wherein said dispersing agent is added at a concentration from

10 to 100 ppm.

8. The method of claim 1 wherein said dispersing agent is added in a mixture with an acid.

9. The method of claim 8 wherein said mixture has a pH from about 2 to 4.

10. The method of claim 1 wherein said dispersing agent is added in a mixture with an oxidizing agent.

11. (Currently Amended) A method of cleaning a microfiltration filter clogged with flocculated materials—~~comprising in a wastewater treatment system wherein wastewater is passed through the microfiltration filter, wherein the method comprises~~ the steps of: determining nature of said flocculated materials clogged on said filter; adding to a quantity of wastewater a dispersing agent suitable to break up said flocculated materials to form dispersed precipitates; soaking the filter in said wastewater and dispersing agent, and back flushing the filter to remove the clogged flocculated materials and ~~removing said dispersed precipitates from~~ restore flux through said filter.

12. (Currently Amended) The method of claim 11 wherein said flocculated material is iron hydroxide or oxide and said dispersing agent is selected from a group consisting of hydroxy-ethylidene diphosphonic acid, sodium diisopropylnaphthalenesulfonate, and ~~other~~ water soluble dispersing agents.

13. The method of claim 12 wherein said flocculated material is iron hydroxide or oxide and said dispersing agent is hydroxy-ethylidene diphosphonic acid.

14. The method of claim 11 wherein said dispersing agent is added at a concentration from 10 to 100 ppm.

15. The method of claim 11 wherein said dispersing agent is added at pH from about 2 to 4.

REMARKS

Please note that the entire right, title and interest in this patent application has been assigned to Ionics, Incorporated, and future correspondence should be addressed to the below-signed attorney.

Claims 1 and 11 are amended herein to more clearly recite the invention, and language which the Examiner had considered indefinite is removed from 3, 5 and 12. For the reasons set forth below, it will be seen that all claims now clearly distinguish over and are patentable over the art of record.

Applicant's claims are directed to a method of cleaning a filter which is already *clogged with flocculated material*, wherein the method is effective to clean a system to maintain flux through a filter, as described in the Disclosure. Figure 2 is stated to show a system described in U.S. Patents No. 5,871,648 and No. 5,904,853, both of which are incorporated by reference in the Disclosure at page 6, line 16. As now more clearly set forth in Claim 1, the method involves cleaning a microfiltration filter which has clogged by passage of wastewater therethrough, and involves steps of adding a dispersing agent to a quantity of the wastewater wherein the dispersing agent is determined to break up floc into smaller particles, soaking the filter in said wastewater and dispersing agent, and back flushing the membrane to remove the clogged flocculated material and restore flux through the membrane. These steps are discussed at page 6, line 32 to page 7, line 11 of the Disclosure and do not involve new matter. As described therein, the method is found to quickly clean the filter, as compared to prior art chemical cleaning regimens, and this is believed to be because in part because it affects the structure of the accumulated floc. The back washed material may then be treated like the normal waste stream.

The Office Action of March 26 had rejected claims 1-8 and 10-14 as assertedly unpatentable under 35 USC 103(a), over commonly-owned Allen et al 6,428,705 in view of McNeel et al 6,180,056. Allen et al admittedly shows a general process of treating waste water by microfiltration, and cleaning of the membranes using a back flushing

procedure. The Office Action asserts that it would be “obvious” to add dispersing agents in view of the teachings of McNeel et al, to disperse the flocculated materials and prevent fouling of the filter.

However, McNeel does not address dispersing floc or treating a filter clogged with floc; such a teaching is absent. The asserted rejection had no application to the original claims 1 and 11, which address cleaning of a filter *that is clogged with flocculated materials* (emphasis added). The McNeel reference teaches a method of preventing fouling by colloidal solids and biological growth (essentially for RO or NF filters, although a claim mentions microfiltration) by adding various materials *upstream of the filter* to prevent such fouling. The McNeel treatment is apparently carried out continuously, and it addresses a different problem entirely, namely that the proteins and biological materials adhere to membranes such as RO membranes, and biogrowth occurs, fouling the membranes. RO membranes are quite different in their operation and characteristics than the systems described by applicant – they are “cross-flow” membrane systems, wherein a high velocity stream of fluid passes with high shear parallel to the surface, and high pressure drives pure water through the membrane. The chemistry of RO or NF membranes makes them prone to attachment of proteins, colloids and biomatter. McNeel addresses this fouling effect, but there is no teaching in McNeel to suggest combining with the filter cleaning process of the first-cited reference. McNeel does not describe a cleaning cycle, but describes 80 hour and 100 hour pilot tests wherein the added cationically-charged biocide is apparently continuously present. McNeel mentions that the biocide does not pass through the membrane, and describes the effect on bacteria present in the reject stream - (It appears that the reject stream would be returned back to the feed to maintain the required level of additive.) - and on the rates of fouling. Thus, McNeel apparently requires the additives (an anionic anti-scalant and a cationically-charged biocide) to be continuously present in the water passed through the device. This does not suggest a cleaning method as recited in applicant’s claims to clean a microfilter clogged with flocculated material, but simply addresses biocontrol and surface affinities of membranes that are prone to biogrowth and accumulation of colloidal material.

Independent claims 1 and 11 are now amended to more clearly recite the invention, and its application in a cleaning operation on a wastewater-treating microfiltration filter that is clogged with flocculated material. The previously-asserted rejections do not apply to the independent claims as now amended.

Applicant's attorney has further reviewed the other references cited but not applied by the Examiner. Several describe cleaning preparations for addressing intractable filter clogging materials, or for general applications, but collectively these references are not believed to affect patentability or raise any issue requiring closer examination regarding the distinctions noted above.

Accordingly, for all the reasons set forth above, the art fails to teach or suggest the combination previously asserted against the independent claims, and the independent method claims 1 and 11, and thus all pending claims are therefore now clearly allowable. Allowance thereof is therefore earnestly solicited at this time. In the event any other matter is found to require attention, the Examiner is requested to telephone the below-signed attorney so that he may expeditiously address such matter.

Respectfully submitted,
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